AS Cont.

37. The composite material of claim 31, wherein the microparticles are microspheres.

REMARKS

The Office Action was issued on pending claims 1-33 in which claims 23-27 were withdrawn from consideration. In this Response, claims 1, 5, 7, and 28-33 have been amended, claims 34-37 have been added, and no claims have been cancelled. Thus, claims 1-22 and 28-37 are pending and under consideration, and claims 23-27 are withdrawn from consideration.

RESTRICTION REQUIREMENT

In Office Action paragraph 4, the Examiner requires affirmation of the election with traverse to prosecute the invention of Group I, claims 1-22 and 28-33. Applicant affirms the election with traverse to prosecute the invention of Group I, claims 1-22 and 28-33. Accordingly, claims 23-27 stand withdrawn from further consideration.

§102 REJECTION OF CLAIMS 1-4, 7, 9-12, AND 28-33

In Office Action paragraph 6, claims 1-4, 7, 9-12 and 28-33 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,250,136 to Rex. Applicant respectfully disagrees.

Independent claim 1 has been amended to clarify that the particles are microsphere particles. Accordingly, Applicant's inventive composite material, as claimed in claim 1, includes a plurality of microsphere particles ranging from about 40% by volume to about 85% by volume. The amendment to claim 1 is supported throughout the Specification and, for example, claim 5 which was not rejected as being anticipated by Rex.

Turning to Rex, Rex pertains to a method of forming a composite structure. The Rex composite structure includes a relatively thick syntactic foam core element 16. See Figs. 1 and 2 of Rex. As acknowledged in the Office Action, the syntactic foam core element 16 includes macro-spheres (large spheres). The macro-spheres have a significantly larger diameter in the range of between 500 and 15,000 microns compared to micro-spheres having a diameter of 10 to 200 or 300 microns. See Rex, column 4, lines 30-38; column 6, lines 42-54, and column 7, lines 46-47. See Applicant's Figs. 3-6 for examples of the significant difference in size of micro-

spheres relative to a 500 micron reference line. The preferred ratio of the volume amount of macro-spheres to micro-spheres in Rex is about 3 or 4 to 1. See Rex, column 7, lines 46-49. The Rex syntactic foam core includes about three or four times the volume amount of macro-spheres than micro-spheres. Accordingly, Rex does not show or describe a composite material having a plurality of microsphere particles ranging from about 40% by volume to about 85% by volume of the composite material. Indeed, claim 5 as originally filed which further defined the particles as hollow microspheres was not rejected as being anticipated by Rex.

Claims 5 and 7 have been amended to be consistent with amended claim 1. Claims 28-33 have been amended to replace "microspheres or particles" with "microparticles." Again, the Rex composite structure includes a substantial amount of macro-spheres (diameter range of between 500 and 15,000 microns) and a substantially lower amount of micro-spheres (diameter range of between 10-300 microns) instead of the claimed microparticles.

Thus, Applicant respectfully submits that the § 102(b) rejection of claims 1-4, 7, 9-12 and 28-33 has been overcome.

§102/§103 REJECTION OF CLAIMS 13 AND 14

In Office Action paragraph 9, claims 13 and 14 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Rex. Applicant respectfully disagrees.

Claims 13 and 14 depend from claim 1, and thus, are allowable for the same reasons that claim 1 is allowable.

Regarding anticipation based on inherency, an inherent limitation is one that is necessarily present in the prior art. Inherency of the limitation in the prior art is not established merely by probabilities or possibilities. Elan Pharmaceuticals, Inc. v. Mayo Foundation for Medical Education and Research, docket no. 00-1467 (Fed. Cir. August 30, 2002). Rex simply does not disclose or suggest Applicant's claimed amount of microsphere particles. Thus, Rex does not inherently or necessarily include the specific gravities claimed in claims 13 and 14 even if there is a possibility the Rex material could be made to have the subject specific gravities. Furthermore, Applicant submits that it would not be obvious to provide the claimed microsphere particle composite material having the specific gravities of claims 13 and 14 because Rex does not include the claimed amount of microspheres.

Thus, Applicant respectfully submits that the §102(b)/§103(a) rejection of claims 13 and 14 has been overcome.

§103 REJECTION OF CLAIMS 5, 6, 8, AND 15-19

In Office Action paragraph 10, claims 5, 6, 8, and 15-19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Rex in view of U.S. Patent No. 6,171,688 B1 to Zheng et al. Applicant respectfully disagrees.

The § 103(a) rejection is improper for at least two reasons: (1) there is no teaching, motivation, or suggestion to combine Rex with Zheng et al., and (2) even if Rex and Zheng et al. are combined, the combination does not result in Applicant's claimed invention.

There is no teaching, motivation, or suggestion to combine Rex with Zheng et al.

Applicant respectfully submits that there is no teaching, motivation, or suggestion to combine Rex with Zheng et al. It is well known that there must be a teaching, motivation, or suggestion to combine prior art references to render a claimed invention obvious. *In re Lee*, 61 U.S.P.Q. 2d 1430 (Fed. Cir. 2002). Further, the teaching, motivation, or suggestion to combine the prior art references must be identified with specificity. *In re Lee*, at 1433.

Rex pertains to a method of forming a composite structure. Rex shows in Fig. 1 a rigid composite structure 10 having thin, hardened outer casings 12 and 14 on top and bottom sides of a syntactic form core element 16. Rex is concerned with overcoming problems in the prior art pertaining to total encapsulation of closed-cell core elements using outer casings. See Rex, column 1, lines 24-38. One of the problems Rex purports to address is resin flowing out of an uncured syntactic foam core during molding. See Rex, column 3, lines 43-63. According to Rex, the less resin in the syntactic form core in proportion to microspheres, the weaker the core and the greater likelihood of structural failure. See Rex, column 3, lines 49-53. In response to that problem, Rex teaches using an open-cell resilient foam layer impregnated with liquid thermal setting resin adjacent the syntactic foam core. The open-cell resin impregnated foam layer functions as a resin reservoir to provide resin during compression molding for the encapsulation of the syntactic foam core and to prevent resin from flowing out of the syntactic core. See Rex, column 3, line 64-column 4, line 3; column 4, lines 14-29; and column 5, lines

15-27 and 61-63. Accordingly, Rex teaches encapsulating a syntactic foam core by compressing an open-cell foam resin reservoir against the syntactic foam core.

The Rex syntactic foam core does include macro-spheres and micro-spheres. However, these spheres are merely considered to be fillers for the resin in the syntactic foam core and are used primarily to reduce density and lighten the cured resin. See Rex, column 6, lines 55-57. Rex emphasizes the use of macro-spheres in the syntactic foam core by preferring about three or four times the volume of macro-spheres as micro-spheres. See Rex, column 7, lines 46-49. Rex provides micro-spheres in the syntactic foam core merely to fill the interstices between the macro-spheres to reduce the core density. The loading factor of micro-spheres is quite low at only about 20%-30%, which is the incremental loading factor above the macro-sphere loading factor of 50%-60%. See Rex, column 7, lines 9-18. Accordingly, nowhere does Rex provide a teaching, motivation, or suggestion to combine Rex with another reference, such as Zheng et al., to provide a composite material having a high loading of micro-spheres.

Turning to Zheng et al., Zheng et al. pertains to a composite material having micro-spheres and various natural fibers, particularly kenaf fibers, to make synthetic wood. Zheng et al. states the problem the prior art is faced with is to provide very low cost, higher strength composite materials using micro-spheres and various natural fibers, particularly kenaf fibers. See Zheng et al., column 1, lines 45-47. Referring to Fig. 1 of Zheng et al., a composite material (synthetic wood) 10 includes a polymer 11, glass micro-spheres 12, fibers 13 (kenaf fibers), polymer micro-spheres 14 and wood particles 15. See Zheng et al., column 3, lines 50-54. The glass micro-spheres are between about 50 and 200 microns in diameter, and the polymer micro-spheres are between about 15 and 50 microns in diameter. See Zheng et al., column 3, lines 56-59. Accordingly, Zheng et al. teaches a synthetic wood material having micro-spheres. Nowhere does Zheng et al. disclose or suggest that the micro-spheres in the synthetic wood material be substituted for macro-spheres, such as the macro-spheres of Rex.

The Office Action, in paragraph 10, asserts that the motivation to combine Rex with Zheng et al. to use the polymer and glass micro-spheres of Zheng et al. in place of the micro-spheres and macro-spheres of Rex is the desire to increase the strength of Rex's composite material. However, Rex does not teach using micro-spheres to increase the strength of the syntactic foam core. Indeed, Rex apparently teaches away from using micro-spheres in its syntactic foam core at increased loading volumes to strengthen the core. Rex states that the

strength of the syntactic foam core actually decreases with increased sphere volume loading. See Rex, column 6, lines 62-66. Zheng et al. apparently relies on the wood flour and natural fibers for strength. See Zheng et al., column 2, lines 53-58. Applicant submits that Rex and Zheng et al. do not provide a motivation for high loading of micro-spheres to increase strength as asserted in the Office Action.

Thus, Applicant respectfully submits that Rex and Zheng et al. are not properly combinable to render Applicant's claimed invention obvious because there is no teaching, motivation, or suggestion to combine the references. For this reason alone, the section 103(a) rejection should be withdrawn.

The combination of Rex with Zheng et al. does not result in Applicant's claimed invention.

Even if Rex and Zheng et al. are combined, the combination does not result in Applicant's claimed invention. Claims 15 and 19 pertain to composite materials and call for microspheres from about 40% to about 85% by volume. Claim 18 also pertains to a composite material and calls for microspheres having a greater volume than the matrix binder material. The combination of Rex and Zheng et al. simply does not result in those claimed features.

As discussed above, there is no teaching, motivation, or suggestion in either Rex or Zheng et al. to replace the Rex macro-spheres with micro-spheres. Rex prefers the use of macro-spheres in a substantial amount greater than micro-spheres. Rex prefers to use about three or four times the volume of macro-spheres than micro-spheres. Rex apparently uses the significantly larger macro-spheres to be a filler which reduces density and lightens the syntactic foam core. The Zheng et al. synthetic wood includes natural wood fibers and two sizes of micro-spheres (glass and polymer micro-spheres, both of which are micro-spheres). Combining Zheng et al. with Rex would at best result in the Rex syntactic foam core having primarily large diameter macro-spheres with a significantly lower amount of two diameter sizes of micro-spheres (such as the glass and polymer micro-spheres of Zheng et al.) The combination of Rex and Zheng et al. may also provide a composite material having the natural wood fibers of Zheng et al. However, the combination of Rex with Zheng et al. does not provide Applicant's claimed invention, as claimed in claims 15, 18, and 19.

Thus, Applicant respectfully submits that the §103(a) rejection has been overcome.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with Markings to Show Changes Made**."

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

1. (Amended) A composite material comprising:

a matrix material; and

a plurality of microsphere particles in the matrix material, the microsphere particles ranging from about 40% by volume to about 85% by volume of the composite material.

5. (Amended) The composite material of any one of claims 1-3, wherein the plurality of microsphere particles are hollow microspheres.

7. (Amended) The composite material of any one of claims 1-3, wherein substantially any given distance between adjacent ~~microspheres~~ microsphere particles is less than a diameter of the smallest microsphere particle.

28. (Amended) A composite material comprising a matrix binder and ~~microspheres or~~ microparticles, wherein said ~~microspheres or~~ microparticles comprise a greater weight percentage of said composite material than said matrix binder.

29. (Amended) A composite material comprising:

up to 50% by weight of a matrix binder; and

from about 50% or greater by weight ~~microspheres or~~ microparticles based upon the total weight of said composite material.

30. (Amended) A composite material comprising a matrix binder and ~~microspheres or~~ microparticles, wherein said ~~microspheres or~~ microparticles comprise a lesser weight percentage of said composite material than said matrix binder.

31. (Amended) A composite material comprising:

up to 50% by weight ~~microspheres or~~ microparticles; and

from about 50% or greater by weight of a matrix binder based upon the total weight of said composite material.

32. (Amended) The composite material of claim 31, wherein said composite material comprises from about 30% to about 45% by weight said ~~microspheres or~~ microparticles; and from about 70% to about 55% by weight said matrix binder based upon the total weight of said composite material.

33. (Amended) The composite material of claim 31, wherein said composite material comprises from about 38% to about 41% by weight said ~~microspheres or~~ microparticles; and from about 72% to about 59% by weight said matrix binder based upon the total weight of said composite material.